Patent Claims

1. An installation, in particular a vacuum process installation, for processing a substrate (130; 230; 330; 430; 530), in particular a semiconductor wafer, having at least one processing station (582-588), characterized in that to hold and/or transport the substrate (130; 230; 330; 430; 530), the installation comprises at least one frame (110; 210; 310; 410; 510) with a clamped-in carrier (120; 220; 320; 420; 520), it being possible for the substrate (130; 230; 330; 430; 530) to be secured to the carrier (120; 220; 320; 420; 520) over a large area.

2. The installation as claimed in claim 1, characterized in that the at least one processing station (582-588) comprises a chuck electrode (140; 240; 340; 440), having a planar outer surface (141; 244; 341; 441), it being possible for the carrier (120; 220; 320; 420; 520) to be positioned parallel and adjacent to the outer surface (141; 244; 341; 441) of the chuck electrode (140; 240; 340; 440).

3. The installation as claimed in claim 2, characterized

a) in that the carrier (120; 220; 320) consists of a nonconductive dielectric material and is provided with a conductive layer (122; 222; 322) on one side;

b) in that the frame (110; 210; 310) is conductive at least regionally; and

c) in that the carrier (120; 220; 320) is clamped in the frame (110; 210; 310) in such a way that the conductive layer (122; 222; 322) is contact-connected to the conductive region of the frame

(110; 210; 310).

4. The installation as claimed in claim 3, characterized in that the carrier (120; 220; 320) is formed by a vacuum-compatible, thermally stable film, in particular of polyimide, and the conductive layer (122; 222; 322) is formed by a vapor-deposited metallization or a conductive polymer.

5. The installation as claimed in claim 4, characterized in that the film (120; 220; 320) is from 50-200 μm, preferably approximately 100 μm, thick, and the metallization (122; 222; 322) is from 0.03-0.5 μm, preferably approximately 0.1 μm, thick.

6. The installation as claimed in one of claims 2 to 5, characterized in that the chuck electrode (347) is constructed on a base body which comprises a radiofrequency electrode (345), the chuck electrode (347) being electrically insulated from the radiofrequency electrode (345), with in particular an insulated leadthrough (348) passing through the radiofrequency electrode (345) being provided for contact-connection of the chuck electrode (340).

7. The installation as claimed in one of claims 2 to 6, characterized in that the chuck electrode (240) comprises a dielectric (243), in particular a plate of aluminum oxide Al_2O_3, which is arranged in such a way that it lies between the chuck electrode (240) and the carrier (220) when the carrier (220) has been positioned parallel and adjacent to the outer surface (244) of the chuck electrode (240).

8. The installation as claimed in one of claims 2 to 7, characterized in that the processing station (582-588) comprises a voltage source (150; 250; 350) for applying a voltage between the frame (110; 210; 310)

and the chuck electrode (140; 240; 340), it being possible in particular to generate a DC voltage of 200-1500 V, preferably 500-1000 V.

9. The installation as claimed in one of claims 2 to 8, characterized in that the chuck electrode (440) comprises a plurality of regions of different polarity.

10. The installation as claimed in one of claims 2 to 9, characterized in that the processing station (582-588) comprises a gas feed (142; 242; 342; 442) for feeding a gas into a space between the chuck electrode (140; 240; 340; 440) and the carrier (120; 220; 320; 420), it preferably being possible to generate a gas pressure of more than 100 Pa.

11. A frame for the installation as claimed in one of claims 1 to 10 for holding and/or transporting the substrate (130; 230; 330; 430), characterized in that it is designed to clamp in a carrier (120; 220; 320; 420), in particular a film.

12. The frame as claimed in claim 11, characterized in that it is at least regionally conductive, in such a manner that a conductive layer (122; 222; 322) of the clamped-in carrier (120; 220; 320) can be contact-connected through the conductive region.

13. A film which is to be clamped into the frame as claimed in claim 11 or 12, characterized in that on one side it has a conductive layer (122; 222; 322), which is preferably formed by a vapor-deposited metallization or a conductive polymer, and in that it is vacuum-compatible and thermally stable, the film substantially being produced from a non-conductive dielectric material, in particular from polyimide.

14. A processing station for the installation as

claimed in one of claims 2 to 10, characterized by a chuck electrode (140; 240; 340; 440) with a planar outer surface (141; 244; 341; 441), the extent of which corresponds to at least one main surface of the substrate (130; 230; 330; 430), it being possible for the chuck electrode (140; 240; 340; 440), together with a carrier (120; 220; 320; 420) positioned parallel and adjacent to the outer surface (141; 244; 341; 441) of the chuck electrode, to form an electrostatic chuck device.

15. A method for processing a substrate (130; 230; 330; 430), in particular a semiconductor wafer, in a vacuum process installation, characterized in that the substrate (130; 230; 330; 430), in order to be held and/or transported, is secured over a large area to a carrier (120; 220; 320; 420) clamped in a frame (110; 210; 310; 410).

16. The method as claimed in claim 15, characterized in that the substrate (130; 230; 330; 430) is adhesively bonded to a first planar main surface (121; 221; 321; 421) of the carrier (120; 220; 320; 420) by means of a vacuum-compatible and releasable adhesive.

17. The method as claimed in claim 16, characterized in that a chuck electrode (140; 240; 340; 440) is arranged with a planar outer surface (141; 244; 341; 441) parallel and adjacent to a second planar main surface (123; 223; 323; 423) of the carrier (120; 220; 320; 420), the second planar main surface (123; 223; 323; 423) being on the opposite side from the first planar main surface (121; 221; 321; 421).

18. The method as claimed in claim 17, characterized in that the first main surface (121; 321; 421) of the carrier (120; 320; 420) is provided with a conductive layer (122; 322; 422).

19. The method as claimed in claim 18, characterized in that the chuck electrode (347) is built on a base body which is formed by a radiofrequency electrode (345), the chuck electrode (347) being electrically insulated from the radiofrequency electrode (345), and the voltage being applied between the chuck electrode (347) and the frame (310) in particular by means of an insulated leadthrough (348).

20. The method as claimed in claim 17, characterized in that the second main surface (223) of the carrier (220) is provided with a conductive layer (222), and in that a dielectric (243) is arranged between the chuck electrode (240) and the second planar main surface (223) of the carrier (220).

21. The method as claimed in one of claims 17 to 20, characterized in that a voltage is applied between the frame (110; 210; 310) and the chuck electrode (140; 240; 340).

22. The method as claimed in one of claims 17 to 21, characterized in that to control the temperature of the substrate (130; 230; 330; 430), a gas at a superatmospheric pressure is introduced into a space between the second main surface (123; 223; 323; 423) of the carrier (120; 220; 320; 420) and the planar outer surface (141; 244; 341; 441) of the chuck electrode (140; 240; 340; 440).

23. The method as claimed in one of claims 17 to 22, characterized in that to release the substrate (130; 230; 330) the conductive layer (122; 222; 322) of the carrier (120; 220; 320) is short-circuited with the chuck electrode (140; 240; 340).